



THE FINISH LINE

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39th ANNUAL GG4 / FT4 SYMPOSIUM MAY 18-19, 2010

Rotating Machinery Services is excited to announce that we will be hosting the 39th Annual GG4 / FT4 Industrial Symposium on Wednesday, May 19th. To kick off the event, a Welcome Reception will be held Tuesday, May 18th from 6 pm—8 pm at the Marriott Courtyard.

The GG4 / FT4 Industrial Symposium is a one-day symposium specifically designed for the GG4 / FT4 operator. The event provides information on how key industry leaders support their fleet on-site through informative presentations, share insights, exchange ideas and find solutions through a roundtable discussion on topics such as: rotating machinery, inlet filters, exhaust stacks, control systems and more.

For additional information, please check out our web site at www.RotatingMachinery.com or contact Kathy Ehasz at 484-821-0702 Ext. 301. Due to limited seating, please reserve your seat today.

API 687 SEMINAR AT RMS—NOVEMBER 1 - 5, 2010

Rotating Machinery Services will host the API 687 Rotor Repair Course at our Bethlehem, Pa office on November 1—5, 2010. The API Rotor Repair Course, based on API standard 687, covers the minimum requirements for the inspection and repair of rotating equipment rotors, bearings and couplings used in the petroleum, chemical and gas industry services.

RMS engineers Dave Linden and Tony Rubino contributed to the writing of the API 687 standard. For more information on the API 687 course, please visit the API website at www.api-u.org/rotorrepair.html.

“YOU CAN TAKE THE BOY OUT OF THE COUNTRY...”

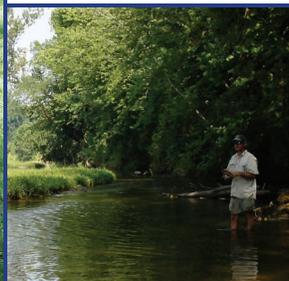
But you can't take the Country out of the boy!”

That's the case with Kurt Diekroeger who grew up in a small town in the mid west where they raised cattle. Kurt went to school at Champaign-Urbana Illinois and flew for the first time when he was a



senior in college. Out of school, he joined I-R, was then transferred to LA and received a major immersion into the big city, (he was referred to as “the Country Bumpkin”).

Kurt has lived in major cities ever since, but still gets back to their farm in Missouri to fish or turkey hunt when he gets a chance. One of the last few escapes from cell phones and emails.



What's Inside

Rule of Thumb 2

Super Alloy Turbine Disks 2

RMS “The Solution” 3

FT4 Rotor Blades 4

RMS Promotions 4

RMS Welcomes 5

RMS Message Board 6

CONFERENCES - 2ND QUARTER

Syn Gas 2010

Tulsa, OK
April 19—21

Eastern Gas Compression Roundtable

Moon Township, PA
May 11—May 13

Electric Power Conference

Baltimore, MD
May 18—20th

GG4/FT4 Industrial Symposium

Bethlehem, PA
May 19

RULE OF THUMB - BEARINGS

By Neal Wikert

Bearings – Tilt Pad

A minimum bearing clearance should be the shaft diameter plus .001". Another way of determining bearing clearance would be .00125" per shaft diameter.

Bearings are considered worn when it is 140% of maximum clearance.

To determine the actual clearance of a tilt pad bearing use the following formula:

Actual clearance = Bump check (x) .89



Bearings – Sleeve

The normal bearing clearance is .001" per inch of shaft diameter + .001", i.e. 5" shaft = .006" (5.006"). Alternately, the clearance should be .00125"/inch of shaft diameter.

Bore of normal babbitt bearings carries a 32 finish and is turned.

No grinding is done on babbitt because it will clog the grinding wheel. Babbitt begins to melt at 450 degrees F, creeps at 275 degrees F.

Bearings - Thrust

Copper backed shoes and offset pivots can add 20% to typical load capability because of better heat transfer.

Thrust Float – Use .0015" (x) the bearing O.D. For example a 12" O.D. thrust bearing should have .018".

Lubrication

Most common oil is an ISO 32 (150 SSU at 100 degrees F.)

Oil is usually supplied at 110-120 degrees F. and 15-25 psig. Bearings are designed/orificed for specific oil supply temperatures and pressures. Off design supply conditions can starve the bearing and cause overheating.

Temperature Monitoring

Temperature detector placement should be located 1/16th inch below the Babbitt bond line – Avoid placing into the Babbitt. Alarm at 235 deg. F., shutdown at 250 deg. F.

RMS SHIPS LARGE SUPER ALLOY TURBINE DISKS

By Robert Klova



RMS recently shipped two large super alloy power turbine disks to separate gas pipeline customers. These disks replaced Ingersoll-Rand and Dresser-Clark components that had exceeded their useful operating lives. (Note that, prior to replacing disks, RMS can perform a Remaining Life Analysis to determine whether replacement is truly necessary.) The approximately 40 inch, 1,600 pound forgings are among the largest super alloy disks used in turbomachinery.

The disks were carefully reverse engineered using techniques developed by RMS to insure 100% dimensional compatibility. As part of our engineering process, RMS investigated and ultimately upgraded both disks from alloy A286 to alloy IN901. For similar costs, we were able to supply a stronger alloy with fewer risk factors.

The RMS Quality Control Plan included special metallurgical requirements, and ultrasonic and fluorescent penetrant inspections to assure a level of quality equal to, or exceeding, that of the original manufacture. RMS Go / No-Go gaging for the fir-tree attachments, and detailed dimensional inspections assured correct as-manufactured dimensions. The disks were successfully assembled into overhauled rotors and shipped to our customers.



RMS “THE SOLUTION”

By Michael Amato

NITRIC ACID COMPRESSOR RERATE & OVERHAUL

A domestic chemical supplier was experiencing cracking issues on their compressor casing which they were unable to remedy. The customer located a surplus casing and contracted RMS to perform the necessary inspections to determine whether the surplus casing could be a drop in replacement. RMS determined that with proper overhaul, the surplus casing could be utilized as a drop in replacement. RMS also offered a rerated new rotor design for increased efficiency.



OVERHAUL OF RT48 POWER TURBINE ROTOR



An RT48 power turbine rotor experienced a gas generator jet engine failure resulting in extensive blade foreign object damage. The damaged rotor was sent to RMS for complete non-destructive testing and dimensional inspection. It was determined that the 1st and 2nd stage disks from the damaged rotor were reusable. A second RT48 rotor assembly with known operating hours was sent to RMS. All components from the second rotor were used with the disks from the first to create a first-class rotor, supported with full documentation.

FT4 GAS TURBINE REPLACEMENT PARTS

RMS was contracted by a domestic energy supplier to provide critical parts for their P&W FT4 gas turbines. 1st and 3rd stage blades, 1st and 2nd stage vanes, 9th, 11th and 12th stage disks, and 3rd stage blades.



OVERHAUL OF IR 5013 FRAME AXIAL COMPRESSOR



A major steel supplier contracted with RMS to provide an overhaul of an axial compressor rotor and flowpath components. After RMS performs visual, dimensional and NDT inspections of the compressor components to evaluate usability, the rotor will be polished, rebladed, balanced and prepped for long term storage. The flowpath variable stators and fixed stators will be weld repaired and upgraded per RMS standards for return to service.

COUPLING GUARD UPGRADE

RMS was contracted to replace the coupling guard between an expander and motor on a PRT train. The typical coupling guard design accommodates axial growth through a sliding fit sealed with "O" rings. This design has been prone to oil leaks due to poor installation. RMS coupling guard design utilizes tight bolting and sealants on all flanges to eliminate potential oil leaks and a flexible bellows to accommodate the train machinery thermal growth. Also, the coupling guard features a vent system fitted with oil mist and smoke elimination coalescing type demisters.



FT4 FREE TURBINE COUPLING



RMS has provided a direct replacement for a P&W model FT4 free turbine coupling. The coupling was manufactured from an ultrasonic quality forging. The original output shaft geometry was duplicated and the original coupling design retained, thereby maintaining overhung weight and torsional stiffness identical to the original configuration. The coupling was subjected to RMS quality standards throughout manufacture.

FT4 ROTOR BLADES

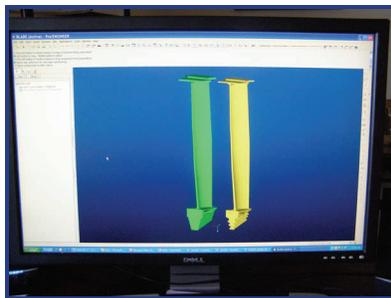
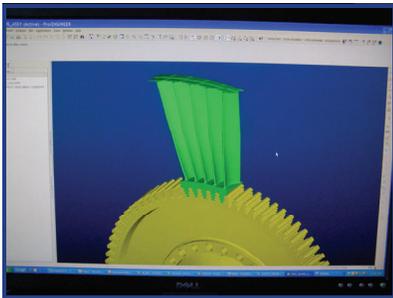
By Richard Pittenger

RMS was recently awarded a contract by a major domestic utility to provide spare FT4 Rotor Blades. Combining the use of traditional inspection techniques such as height gages, micrometers, and calipers, RMS incorporated the newest reverse engineering methods such as high accuracy laser scanners, 3D modeling software, FEA analysis software, and prototype modeling creation whenever possible.

To ensure the form, fit, function and integrity of the replacement FT4 Rotor Blades, the existing blade was first scanned using a high accuracy CMM mounted laser scanner accurate to 0.001". The scanned data was then used to create a Pro-Engineer 3D solid model. This model was then used to create Stereolithography (SLA) prototype part made from a resin compound, accurate to within 0.002" of the original scanned part.

The benefits of the 3D model, however, do not stop there. Information is extracted from the model for any necessary FEA analysis, creation of corresponding 2D Casting and Machining drawings, and eventually is forwarded to our casting and machining vendors for their use in tooling and inspection gage creation.

Modern capabilities, proven experience, dedication to a superior product, just a few way RMS is focused on "Quality from start to finish".



CONGRATULATIONS TO THE FOLLOWING STAFF MEMBERS ON THEIR PROMOTIONS!



Frank Marrone, Jr. – Director Materials & Facility Services

Frank has been promoted to Director Materials & Facility Services. He has been with Rotating Machinery Services for 5 years and previously held the position of Manager of Purchasing.

In his new position, Frank will be responsible for directing overall operations of Materials and Facilities Management, establishing strategies to support organization objectives for procurement outsourcing of production manufacturing and indirect facility services, as well as oversee entire purchasing function to maximize cost savings and overall company efficiency.



Kathy A. Ehasz – Manager – Marketing / Engineering Support

Kathy has been promoted to Manager – Marketing / Engineering Support. She has been with Rotating Machinery Services for 6 years and previously held the position of Sr. Office Administrator.

In her new position, Kathy will be responsible for all marketing, advertising and promotional activities, establishing marketing strategies to meet organizational objectives and evaluate customer research, market conditions, competitor data and implement marketing plan changes as needed. She will also provide Engineering support to Senior Engineers.



ROTATING MACHINERY SERVICES, INC. & RMS POWER SOLUTIONS, LLC. WELCOMES:



Michael Amato – Project Manager

Michael has joined Rotating Machinery Services, Inc. as Project Manager. He has thirty seven years of Turbo Machinery design experience specializing in axial compressor, steam turbines and centrifugal compressors for the refining, steel & petro-chemical industry. Twenty one years experience in multi-vendor machinery design with an emphasis in rerates, upgrades and replacement of Turbo Machinery components.

He previously held positions at General Electric Oil & Gas, Conmec, Foster Wheeler Inc. and Ingersoll Rand.



Steven Moser – Drafting/3D Design

Steven has joined Rotating Machinery Services, Inc. as Drafting / 3D Design. He has twenty years of experience in the inspection, layout and design drafting of various types of turbomachinery and related packaging. Product line experience includes steam turbines, hot gas expanders, axial compressors and centrifugal compressors. previously held position at General Electric Oil & Gas, Conmec as a Senior Cad Designer.



Gary Rohn – Assembler

Gary Rohn has joined RMS Power Solutions, LLC. as Shop Assembler. He has 30 years experience in buildup of welding, metal spraying, fabricating of used parts and balancing rotor assemblies. He has also been a production machinist running CNC, vertical, horizontal and lathe machines and experience in the setup and editing of first-run pieces on the CNC machines and in the assembly and disassembly of gear boxes, punch press fly-wheel clutch assemblies, pumps, and large turbo machinery.

He previously held positions at General Electric Oil & Gas, Conmec and Crowder Jr.



Russ Espenschied, P.E. – Regional Sales Manager – Northeast

Russ has joined Rotating Machinery Services, Inc. as the Regional Sales Manager – Northeast. He has twenty-eight years of turbomachinery experience, including sales and application engineering, project development, field service for equipment installation and start up, new plant construction, environmental compliance, engineering management, and Lean Six Sigma. Experienced with centrifugal, axial, screw and reciprocating compressors; nitric and FCCU expanders; power turbines; lube and seal oil consoles and other auxiliary systems. Russ will be responsible for technical sales engineering and customer support functions.



Chris Browne - Project Manager

Twenty years experience in Design and Project Management. Most recently, Chris worked at the Mack Trucks Engineering Test Center as a Designer. He in the Product Development group, specializing in front suspension design and implantation for new truck models.



David S. Rehaut - FT4 Sales Manager

Dave has over 35 sales years experience working for Praxair Surface Technologies as a Sr. Account Manager and Sales Manager, Prior to Praxair he was a Design Engineer for Exxon Corp, for 7 years. David has a Master's Degree in Chemical Engineering from Columbia University. While at Praxair his customers included Pan Am Airways, PWA West Palm Beach, and Bethlehem Steel as well as various Utilities where he sold coatings for FT-4 applications.



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Services, Inc.**

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**GG4 / FT4 INDUSTRIAL
SYMPOSIUM**

**HOSTED BY RMS
MAY 19, 2010**

DETAILS INSIDE

PRODUCT LINES:

**AXIAL COMPRESSORS •
CENTRIFUGAL COMPRESSORS •
EXPANDERS • GAS TURBINES •
POWER TURBINES •
STEAM TURBINES**

PRSR STD
US POSTAGE PAID
EASTON, PA
PERMIT NO. 65

RETURN SERVICE REQUESTED

NEW!!

**RMS MESSAGE
BOARD**

LOOKING FOR ...

- > ADVISE?**
- > TECHNICAL EXPERTISE?**
- > TO SHARE EXPERIENCES?**

With an average of 25 years of turbomachinery engineering experience and the extensive knowledge of our staff, Rotating Machinery Services has set up a forum for turbomachinery discussions on our web site. The forum was developed to assist users with turbomachinery troubleshooting, best practices, advice, industry experience and to facilitate shared experience among users.

To participate in the discussions or ask questions, please go to our website at www.RotatingMachinery.com, on left side of page, click the icon labeled "MESSAGE BOARD" Please read the rules and regulations.